

## **Multi-Functional Device for a Computer**

### Background of the Invention

**[0001]** Storage and entertainment devices include video players, DVD players, VCRs, audio players, MP3 players, CD players, radios, tape players, video recorders, cameras, audio recorders, computers, personal digital assistants and televisions, among many others. Some "stand-alone" devices can be connected to a computer system for uploading and/or downloading of content (e.g. entertainment, software, games, data, images, audio, video, etc.) to be played by the stand-alone devices or by the computer system. A cable makes the physical connection between the stand-alone device and the computer system. The stand-alone device, thus, is kept external to the computer system.

**[0002]** Since the stand-alone device is external to the computer system, the stand-alone device occupies a portion of a user's limited workspace. Furthermore, the length of the cable may limit placement of the stand-alone device with respect to the computer. Additionally, when carried with a notebook computer, the stand-alone device and cable are additional items that the user must carry. Carrying the stand-alone device and the cable may be cumbersome, especially if space is limited in a carrying case.

**[0003]** Some computer systems have a built-in storage or entertainment device, such as a CD/DVD player or TV tuner. Thus, the inconvenience of having to make room for and keep up with a separate item is avoided. However, the size and portability advantages of using a compact, stand-alone, lightweight device are lost.

### Summary of the Invention

**[0004]** According to a particular embodiment of the present invention, a computer comprises an internal device bay and a multi-functional device. An electrical connector is disposed in the internal device bay. The multi-functional device is insertable in the internal device bay and connectable to the electrical connector. The multi-functional device has a first set of functions when the multi-functional device is inserted into the internal device bay and connected to the electrical connector and a second set of functions when removed from the internal device bay.

**[0005]** According to another embodiment of the present invention, a multi-functional device comprises a body and a mating electrical connector. The multi-functional device can be connected to a personal electronic system having an internal device bay and an electrical connector accessible within the internal device bay. The body is insertable at least partially into the internal device bay of the personal electronic system. The mating electrical connector is adapted to connect to the electrical connector of the personal electronic system upon inserting the multi-functional device into the internal device bay. The multi-functional device operates in a first functional capacity when inserted at least partially into the internal device bay and connected to the electrical connector. The multi-functional device operates in a second functional capacity when removed from the personal electronic system.

**[0006]** According to yet another embodiment, a method for using a multi-functional device comprises electrically connecting the multi-functional device to a personal electronic system by inserting the multi-functional device at least partially into an internal device bay of the personal electronic system, operating the multi-functional device in a first functional capacity when the multi-functional device is inserted in the internal device bay of the personal electronic system, electrically disconnecting the device from the personal electronic system by removing the device from the internal device bay of the personal electronic system, and operating the multi-functional device in a second functional capacity when the multi-functional device is removed from the personal electronic system.

#### Brief Description of the Drawings

**[0007]** Fig. 1 is a perspective view of a computer system and an multi-functional device incorporating an embodiment of the present invention.

**[0008]** Fig. 2 is another perspective view of the computer system and the multi-functional device shown in Fig. 1.

**[0009]** Fig. 3 is another perspective view of the multi-functional device shown in Fig. 1.

**[0010]** Fig. 4 is yet another perspective view of the multi-functional device shown in Fig. 1.

**[0011]** Fig. 5 is a front view of the computer system shown in Fig. 1.

**[0012]** Fig. 6 is another perspective view of the computer system and the multi-functional device shown in Fig. 1 in another configuration.

**[0013]** Fig. 7 is another perspective view of the computer system and the multi-functional device shown in Fig. 1 in yet another configuration.

**[0014]** Figs. 8-17 are perspective views of alternative multi-functional devices incorporating various other embodiments of the present invention.

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#### Detailed Description

**[0015]** An exemplary computer system 100 and an exemplary multi-functional storage, computer and/or entertainment device 102 inserted in the computer system 100 and incorporating an embodiment of the present invention are shown in Fig. 1. Although the computer system 100 is shown as a notebook PC, the invention is not so limited, but may be any type of computer system or personal electronic system that may be used to play, store or transfer content, such as a notebook PC, a desktop PC, a computer server, a mainframe computer, a palmtop computer, a personal digital assistant (PDA), a video gaming system, an audio/video player, a television, a home entertainment system, etc. The multi-functional device 102 may be any type of electronic device that stores, operates, plays or otherwise uses content, such as entertainment, software, games, data, images, audio, video, etc. Thus, the multi-functional device 102 may be a video player, a DVD player, a VCR, an audio player, an MP3 player, a CD player, a radio, a tape player, a video recorder, a still image camera, a video camera, an audio recorder, a computer, a personal digital assistant, a phone, a game player or a television, among many other electronic devices.

**[0016]** The computer system 100 includes a display section 104 and a base section 106. The display section 104 includes a display screen 108. The base section 106 includes a keyboard 110 and a pointing device 112 exposed in a top side 114 of a housing 116. The computer system 100 also preferably includes optional speakers 117 in any appropriate location, such as exposed on the top side 114 of the housing 116, as shown. The base section 106 also preferably includes most of the electronic components of the computer system 100.

**[0017]** The multi-functional device 102 has a housing 118 (Fig. 2) adapted to be inserted at least partially inside a device bay 119 in the base section 106, as shown in the configuration of Fig. 1. In this configuration, content (e.g. audio, video, images, games, etc.) is transferred between the multi-functional device 102 and the computer system 100. For example, entertainment content may be played from the multi-functional device 102 through the computer system 100 at the display screen 108

and/or the speakers 117. Alternatively, the entertainment content may be uploaded from the multi-functional device 102 to the computer system 100 or downloaded from the computer system 100 to the multi-functional device 102 for immediate or later usage.

5     **[0018]** The multi-functional device 102 can also be removed from the device bay 119 of the computer system 100, as shown in the configuration of Fig. 2. In this configuration, the content is created (e.g. for a video recorder, audio recorder, camera, etc.) and/or played (e.g. for a video player, audio player, game player, etc.) by the multi-functional device 102.

10     **[0019]** In the multi-functional device 102, the content may be stored on a fixed storage media (such as a hard drive or the like) or a removable storage media 120 (such as a CD, a DVD, a tape, a Compact Flash (TM), a SanDisk (TM), a SmartMedia (TM), etc.). The removable storage media 120 can be inserted into the multi-functional device 102 through a storage media aperture 122 in a front side 124 of the multi-functional device 102. The front side 124 is preferably exposed from a side 126 of the housing 116 of the base section 106 when the multi-functional device 102 is in the base section 106, so the storage media aperture 122 is accessible in this configuration.

15     **[0020]** The multi-functional device 102 preferably has various optional control/interface elements exposed on the front side 124, such as an eject button 128, a volume control dial 130, an LED indicator 132 and a headphone jack 134. The multi-functional device 102 also preferably has additional optional control/interface elements 136 (Figs. 2 and 3) exposed on other sides 138, 140 and 142 of the housing 118 that are not accessible when the multi-functional device 102 is in the device bay 119, but only accessible when the multi-functional device 102 is outside of the computer system 100. The control/interface elements 128-134 on the front side 124 are preferably those that a user may need to access whether the multi-functional device 102 is in or out of the computer system 100. For instance, the user may need to eject the removable storage media 120 out through the storage media aperture 122 by pressing the eject button 128 at any time, whether using the multi-functional device 102 as a stand-alone device or as a peripheral device in the computer system 100. Additionally, the user may need to adjust the volume of audio played by the computer system 100 or the multi-functional device 102 by turning the volume control dial 130, bypassing any volume control features of the computer system 100. Furthermore, the

LED indicator 132 signifies to the user whether the storage media is being accessed at any time. Additionally, the user may insert a plug for headphones into the headphone jack 134 when listening to audio entertainment content through the multi-functional device 102 or the computer system 100, bypassing the speakers 117.

5 **[0021]** The additional control/interface elements 136 are preferably those that a user may need to access only when the multi-functional device 102 is out of the computer system 100 and serving as a stand-alone device. For a video or still-image camera, for example, a camera lens 144 and a view finder 146 are not useable when the multi-functional device 102 is inside the computer system 100, so any control/interface  
10 elements 136 used to cause the multi-functional device 102 to record or view video or images are not needed in the configuration shown in Fig. 1. Likewise, for a video player, the control/interface elements 136 for typical functions, such as play, pause, stop, fast forward and reverse, need to be accessible only when the multi-functional device 102 is out of the computer system 100, since the computer system 100  
15 typically already has such capabilities that the user can utilize when the multi-functional device 102 is inside the computer system 100.

**[0022]** The multi-functional device 102 also preferably has an electrical connector 148 disposed on a back side 150 of the housing 118, as shown in Fig. 4. The electrical connector 148 mates with another electrical connector 152 disposed within  
20 the bay 119, as shown in Fig. 5, when the multi-functional device 102 is inserted into the computer system 100 to form an electrical connection between the multi-functional device 102 and the computer system 100 through which control signals and the content pass.

**[0023]** In alternative exemplary configurations, as shown in Figs. 6 and 7, the multi-functional device 102 connects to the computer system 100 in a manner that enables  
25 usage of features that are inaccessible when the multi-functional device 102 is inside the computer system 100. In the configuration shown in Fig. 6, for example, the multi-functional device 102 is mounted on an edge 154 of the display section 104 of the computer system 100. The electrical connector 148 (Fig. 4) is physically connected to the computer system 100 either directly to a mating electrical connector on the edge  
30 154 or indirectly via an adapter 156. Alternatively, the multi-functional device 102 is electrically connected to the computer system 100 via some other means, such as a cable connection or wireless link, and the adapter 156 provides only a physical

support for the multi-functional device 102. The adapter 156 may also preferably enable directional positioning of the multi-functional device 102.

**[0024]** In the configuration shown in Fig. 7, for example, the multi-functional device 102 is mounted on a cradle 158 separate from the computer system 100. The multi-functional device 102 is preferably electrically connected to the computer system 100 by any appropriate means, such as a wireless link or a physical cable 160, as shown.

**[0025]** In either of these alternative exemplary configurations, the multi-functional device 102, as a video camera, is conveniently used for video conferencing through the computer system 100. However, the user does not have to carry a separate video camera in addition to the computer system 100, since the multi-functional device 102 may normally be carried inside the computer system 100. Additionally, the ability to use the wireless link or the physical cable 160 also enables the multi-functional device 102 to connect to any other compatible device, such as a printer, an entertainment device, etc., without requiring the other device to have a bay for the multi-functional device 102.

**[0026]** In an alternative embodiment, as shown in Fig. 8, a multi-functional device 162 may comprise a video player or a DVD player. In this embodiment, the multi-functional device 162 preferably includes a display screen 164 on which to display the video. The multi-functional device 162 may also include an optional speaker 166, in addition to or instead of the headphone jack 134. Additionally, as a DVD player, the multi-functional device 162 preferably includes the storage media aperture 122 (and eject button 128) through which a DVD disk containing video content is inserted. As a generalized video player, on the other hand, the multi-functional device 162 may receive the video content from the computer system 100 (Figs. 1 and 2) and may include any appropriate device on which to store the video content, such as an internal storage device (e.g. a fixed hard drive, a nonvolatile solid state device, etc.) or a recordable removable storage media (e.g. a DVD-RW, DVD+RW or DVD-R disk, etc.), so the storage media aperture 122 may be optional in this case. When the multi-functional device 162 of this embodiment is inserted in the computer system 100, the multi-functional device 162 may receive the video content from the computer system 100 and store the video content, or the multi-functional device 162 may transfer the video content to the computer system 100 for display through the computer system 100. When the multi-functional device 162 of this embodiment is

removed from the computer system 100, the multi-functional device 162 may play the video content on the display screen 164.

**[0027]** In another alternative embodiment, as shown in Fig. 9, a multi-functional device 168 may comprise a video recorder for capturing video content from a video source while the video content, such as a television program, is being played. In this embodiment, the multi-functional device 168 preferably includes the display screen 164, the headphone jack 134, the volume control dial 130 and the optional speaker 166, so a user can monitor the video content being recorded. Additionally, the multi-functional device 168 preferably includes one or more recessed video input ports 170 and 172 for connecting to the video source, such as a television, a cable TV decoder box, a satellite TV receiver, a video player, etc. The presence of the storage media aperture 122 (and eject button 128) depends on whether the multi-functional device 168 is to store the video content on an internal storage device only for playback by the multi-functional device 168, or is to store the video content on recordable removable storage media for playback by another device. When the multi-functional device 168 of this embodiment is inserted in the computer system 100, the multi-functional device 168 may record the video content from the computer system 100 or transfer previously-recorded video content to the computer system 100. When the multi-functional device 168 of this embodiment is removed from the computer system 100, the multi-functional device 168 may record the video content from any appropriate video source that can connect to any of the video input ports 170 and 172.

**[0028]** In another alternative embodiment, as shown in Fig. 10, a multi-functional device 174 may comprise a television for viewing broadcast television video content. In this embodiment, the multi-functional device 174 preferably includes the headphone jack 134, the volume control dial 130, the display screen 164 and the optional speaker 166. Additionally, the multi-functional device 174 also preferably includes an antenna 176 and a TV tuner knob 178. Alternatively, instead of the TV tuner knob 178, which is typically an analog device, the control/interface elements 136 may be used for digital tuning of the multi-functional device 174. When the multi-functional device 174 of this embodiment is inserted in the computer system 100, the multi-functional device 174 may play the television video content through the computer system 100. When the multi-functional device 174 of this embodiment is removed from the computer system 100, the multi-functional device 174 may display the television video content on the display screen 164.

**[0029]** In another alternative embodiment, as shown in Fig. 11, a multi-functional device 180 may comprise an audio player, a CD player or an MP3 player for playing audio content. In this embodiment, the multi-functional device 180 preferably includes the headphone jack 134, the volume control dial 130, one or more of the optional speaker 166 and a display 182 for viewing feedback regarding the audio content. As a CD player, the multi-functional device 180 includes the storage media aperture 122 for insertion of CDs. As an MP3 player, however, the storage media aperture 122 may be optional, since the audio content may be stored either on an internal fixed storage device or on a removable storage media. When the multi-functional device 180 of this embodiment is inserted in the computer system 100, the multi-functional device 180 may play the audio content through the computer system 100 or receive the audio content from the computer system 100 for later playing. When the multi-functional device 180 of this embodiment is removed from the computer system 100, the multi-functional device 180 may play the audio content through either the optional speakers 166 or the headphone jack 134.

**[0030]** In another alternative embodiment, as shown in Fig. 12, a multi-functional device 184 may comprise an audio tape player for playing audio content from an audio tape. In this embodiment, the multi-functional device 184 preferably includes the headphone jack 134, the volume control dial 130, one or more of the optional speaker 166, control buttons 186 (e.g. for play, stop, fast forward and reverse), a tape access aperture 188 and a tape eject button 190. When the multi-functional device 184 of this embodiment is inserted in the computer system 100, the multi-functional device 184 may play the audio content through the computer system 100. When the multi-functional device 184 of this embodiment is removed from the computer system 100, the multi-functional device 184 may play the audio content through either the optional speakers 166 or the headphone jack 134.

**[0031]** In another alternative embodiment, as shown in Fig. 13, a multi-functional device 192 may comprise an AM, FM or XM radio for playing broadcast radio audio content. In this embodiment, the multi-functional device 192 preferably includes one or more of the optional speaker 166, the headphone jack 134, the volume control dial 130, the antenna 176 and either control buttons 194 for digital radio tuning with a digital display 196 or an analog tuner knob 198 for analog tuning with an analog sliding frequency indicator 200. When the multi-functional device 192 of this embodiment is inserted in the computer system 100, the multi-functional device 192



may play the broadcast audio content through the computer system 100. When the multi-functional device 192 of this embodiment is removed from the computer system 100, the multi-functional device 192 may play the broadcast audio content through either the optional speakers 166 or the headphone jack 134.

5     **[0032]** In another alternative embodiment, as shown in Fig. 14, a multi-functional device 202 may comprise an audio recorder for recording audio content. In this embodiment, the multi-functional device 202 preferably includes one or more of the optional speakers 166, the headphone jack 134, the volume control dial 130 and the storage media aperture 122. The storage media aperture 122 may be optional, since  
10     the audio content may be recorded on either an internal fixed storage media or a removable storage media. The multi-functional device 202 also preferably includes a microphone 204 for receiving the audio content, control buttons 206 for record/play/fast forward/rewind/stop controls and a display 208 for indicating status. When the multi-functional device 202 of this embodiment is inserted in the computer  
15     system 100, the multi-functional device 202 may play the audio content through the computer system 100 or record the audio content using a microphone of the computer system 100. When the multi-functional device 202 of this embodiment is removed from the computer system 100, the multi-functional device 202 may either play the audio content through the optional speaker 166 or the headphone jack 134 or record  
20     the audio content through the microphone 204.

25     **[0033]** In another alternative embodiment, as shown in Fig. 15, a multi-functional device 210 may comprise a cordless or cell phone for making phone calls (or other wireless communication device for wirelessly transferring information). In this embodiment, the multi-functional device 202 preferably includes the microphone 204, a speaker 212, a phone keypad 214, a display screen 216, other control/menu buttons 218 and the antenna 176. When the multi-functional device 210 of this embodiment is inserted in the computer system 100, the multi-functional device 210 may provide a wireless phone link for the computer system 100. When the multi-functional device 210 of this embodiment is removed from the computer system 100, the multi-  
30     functional device 210 serves as a stand-alone cordless or cell phone.

30     **[0034]** In another alternative embodiment, as shown in Fig. 16, a multi-functional device 220 may comprise a small tablet computer or PDA. In this embodiment, the multi-functional device 220 preferably includes a touch screen 222, a writing stylus 224 and various control buttons 226. The multi-functional device 220 also preferably

includes an internal storage device in addition to or instead of a removable storage media. Thus, the storage media aperture 122, the eject button 128, the volume control dial 130, the LED indicator 132 and the headphone jack 134 may be optional, depending on whether the multi-functional device 220 uses the removable storage media. When the multi-functional device 220 of this embodiment is inserted in the computer system 100, the multi-functional device 220 may serve as a general purpose storage device for the computer system 100 and may exchange files and information (such as entertainment content, software, data, etc.) with the computer system 100. When the multi-functional device 220 of this embodiment is removed from the computer system 100, the multi-functional device 220 serves as a stand-alone tablet computer or PDA with which the user interacts via the touch screen 222 (e.g. with the writing stylus 224 and various screen icons 228 and menus 230) and the control buttons 226.

**[0035]** In another alternative embodiment, as shown in Fig. 17, a multi-functional device 232 may comprise a tape-based digital camcorder for recording audio/video content on a digital tape. In this embodiment, the multi-functional device 232 preferably includes the lens 234, a tape aperture 236, a tape eject button 238, the control/interface elements 136 and the headphone jack 134. The multi-functional device 232 also preferably includes a view finder similar to the view finder 146 shown in Fig. 3. When the multi-functional device 232 of this embodiment is inserted in the computer system 100, the multi-functional device 232 may exchange audio/video content with the computer system 100 and may also serve as a general purpose storage device or tape backup device for the computer system 100. When the multi-functional device 232 of this embodiment is removed from the computer system 100, the multi-functional device 232 serves as a stand-alone tape-based digital camcorder, which the user operates via the control/interface elements 136.

**[0036]** The embodiments described herein are exemplary only. Other multi-functional devices may also fall within the scope of the invention, each multi-functional device generally having one set of functions when inserted in the computer system 100 and a second set of functions, in some cases overlapping the first set of functions, when removed from the computer system. For those embodiments that include a form of storage, the multi-functional devices may also serve as general-purpose file storage devices, or multi-functional storage drives, for the computer system 100 into

which the multi-functional devices are inserted. Additionally, functions ascribed to different embodiments may be combined in a single multi-functional device.